

REMARKS

This is in response to the Office Action dated July 12, 2004, claims 1-9 are pending in the present application. Claims 1-9 stand rejected. Applicant respectfully requests reconsideration of the claim rejections based on the above amendment and following remarks.

Claims Rejections – 35 U.S.C. §102, 103(a)

Claims 1-4 are rejected under 35 U.S.C. §103(a) as being unpatentable over U. S. Patent No. 5,175,733 to Nugent (hereafter "Nugent") in view of U.S. Patent No. 5,826,033 to Hayashi et al. (hereafter "Hayashi") and U.S. Patent No. 5,737,628 to Birrittella et al. (hereafter "Birrittella"). The Office Action points out that Nugent teaches the "indirectly sending..." recitation of Claim 1.

Applicant respectfully disagrees. Nugent teaches directional routing based on displacement being either positive or negative (Col. 14, lines 1-10), but does not teach wrapping of packets over end processors in a processor array. Further, it is clear from Nugent's Figures 3 and 4 that there are no end processors with wrapped paths. Nugent as show in its Figure 3 shows routing path from 310 to 322 for avoiding busy channel 331 and routing path 324 to 314 avoiding busy channel 335 and hence Nugent makes no suggestions directed to any wrapped path routing. Moreover, Nugent cannot be said to teach "indirectly sending ... to follow at least one wrapped path..." because no wrapped path routing mechanism is taught by Nugent.

Further, Nugent discloses a routing system based on a displacement factor being either positive or negative. "If the X displacement of the message is less than zero...message is routed in the -X direction...the X displacement is greater than zero...routed in +X direction." (Col. 14, lines 1-10). Hence, Nugent clearly does not suggest "determining whether a result of directly sending a packet from an initial processor to a target processor is less than or greater than $N/2$ moves", as recited in Claim 1.

The Office Action applied Hayashi to show that it "teaches a number of moves equaling $N/2$ ". However, this is not the case. Hayashi discloses that in its two-dimensional torus "...an average message moving distance is $a/2$ when a is even, the

number of processor elements is a^2 and the number of communication paths is $2a^2\dots$ ". (Col. 9, lines. 31-33). Hayashi but merely indicates that the average moving distance is $a/2$, but does not indicate use of either direct or indirect routing based upon "determining whether a result of directly sending...is less than or greater than $N/2$ moves...", as recited in Claim 1.

Hayashi in its Figure 14 (and in the corresponding description at Col. 16, lines 34-36) merely indicates that its second processor PE2 separated by $a/2$ positions from first processor PE1, however this is a static arrangement of processors separated by an " $a/2$ " distance and cannot be equated with a dynamic routing technique, where direct or indirect routing is selected based on the determination of a factor's value being less than or greater than $N/2$, as claimed in the present invention. Further, Hayashi's routing techniques are not directed towards processor networks where end processors have wrapped paths (See Hayashi's Figure 9). Hence, Hayashi cannot be said to teach the step of "determining...result" based on result being less than or greater than " $N/2$ " and further using direct or indirect routing based on such result, essentially as claimed in Claim 1.

Birrittella also fails to disclose the wrapped path feature of the Applicants' invention. Birrittella's Figure 11 clearly shows that there are no end-processors at its array end that have wrapped paths where its unused inputs are connected to outputs. Birrittella while describing FIG. 11 (Col. 9, lines 10-15) clearly indicates that packets are routed in different directions by using axes change in routes and not "...wherein the packet is sent to one of the end processors and routed around the wrapped path of the one end processor to change the direction of the packet's propagation towards the destination processor", as recited in Claim 1. Arrows indicating routing path 11 that direction change is performed by routing to different axes because unlike the applicants invention there are no end-processors that create wrapped paths. Further, it is clear from Birrittella's Figures 7-13 that Birrittella's disclosure connects outputs of one nodes to another node to create alternate routes, but not a single node is shown with wrapped paths where the "unused outputs of an end processor" are connected to "corresponding unused inputs of the same end processor" (Claim 1). Hence, Birrittella cannot be said to teach wrapped paths at each end processor array and hence even if combined with

Nugent and Hayashi, does not render Claim 1 obvious. Therefore, Applicants respectfully request the Examiner to withdraw the rejection of Claim 1 and allow the same. Claims 2-4 depend on Claim 1 and hence are allowable for at least the same reason(s) as Claim 1.

Claims 5 was rejected under 35 U.S.C. 103(a) as unpatentable over Nugent in view of Hayashi and further in view of Birrittella and U.S. Patent No. 6,449,667 to Ganmukhi et al (hereafter "Ganmukhi").

Claim 5 depends upon Claim 1. Nugent, as discussed above in detail, fails to teach "indirectly sending ... to follow at least one wrapped path..." because no wrapping mechanism exists in Nugent. Further, Birrittella also fails to disclose a wrapping path because nodes in Birrittella are shown to connect to other nodes and hence do not disclose end processor nodes where unused inputs and outputs of the same end processor are connected to form a wrapped path. Hayashi fails to disclose a routing technique that selects indirect or direct routing depending on a result of determining a $N/2$ value. Hence, Nugent, Hayashi Birrittella cannot be combined with Ganmukhi to disclose or suggest the Claim 1 recitations that are part of Claim 5.

The Office Action cites Ganmukhi's Col. 7, line 11 to Col. 8, line 64 as disclosing the Claim 5's step of "...the target processor receiving the packet upon a second pass thereby, when the packet is sent indirectly". It is unclear from the cited text from Col. 7, line 11 to Col. 8, line 64. In any case, Ganmukhi does not disclose, "the packet follows at least one wrapped path". Thus Ganmukhi fails to cure the deformities of Nugent, Hayashi and Birrittella to render Claim 5 obvious.

Claims 6-8 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nugent in view of Hayashi and further in view of Birrittella and U.S. Patent No. 5,570,084 to Ritter et al. (hereinafter Ritter).

Claims 6-8 depends on Claim 1. As discussed above in detail, Nugent, Hayashi and Birrittella does not render obvious the features of Claim 1.

Ritter is directed to a routing system in a wireless systems and its bit flags are used for directing the packets in such a wireless systems. Ritter does not disclose "the

packet follows at least one wrapped path." Hence, even if Ritter was combined with Nugent, Hayashi and Birrittella Claims 6-8 are not rendered obvious.

Claim 9 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Nugent in view of Hayashi and further in view of Birrittella, Ritter and Ganmukhi.

Claim 9 depends on Claim 1.

Ganmukhi does not disclose any method of routing over wrapped paths but is directed to routing over a tree like arrangement of nodes. Further, Ganmukhi does not teach queuing of packets over first and second queues in a wrapped path network of processors, because Ganmukhi is concerned with tree like node arrangement. Hence Ganmukhi cannot be combined with Nugent, Hayashi, Birrittella and Ritter to render Claim 9 obvious. The Applicants, therefore, respectfully request the Examiner to withdraw the rejection of Claim 9 and allow the same.

The newly added Claim 22 is also not rendered obvious by any combination of Nugent, Hayashi, Birrittella and Ritter and Ganmukhi references (hereinafter collectively "the References") for reasons discussed above in detail. None of the References disclose creating wrapped paths by "...connecting unused outputs of an end processor to corresponding unused inputs of the **same end processor**". Further, none of the References determine using direct or indirect routing using a factor ("estimated result") being "less than or greater than $N/2$ moves".

The References even when combined, fails to teach the indirect routing where the packet is sent "...to an end processor located in a direction opposite to a direct path between the initial processor and the destination processor and then routing the packet at the end processor around the wrapped path to be sent to the destination processor in the direct path's direction." Such routing is not taught by any combination of the References because none of them disclose an end-processor that is used to create a wrapped path as described above. Hence, Claim 22 is also allowable over any combination of the References. The Applicants hence respectfully request the Examiner to allow the Claim 22.

The Examiner's withdrawal of the claim rejections is respectfully requested.
Early and favorable reconsideration is respectfully requested.

Respectfully submitted,



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